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Geographic Information Systems (GIS) Metadata Technical Specifications

I. Purpose

These are Technical Specifications for metadata documents submitted for publication on the Montana Geographic Information Systems Portal at http://gisportal.mt.gov. The GIS Portal is a central location for the discovery of Geographic Information System (GIS) data about Montana, and it provides a map viewer that allows anyone to view GIS datasets that are available through web services.

Metadata is data about data (e.g., field length, type of data, etc). In the context of the GIS Portal, a metadata document is an extensible markup language (XML) file that contains descriptive information about a GIS dataset. The XML file must conform to a standard that allows the portal software to load it into a searchable index, provide basic descriptive information about the dataset, and provide information that allows users to retrieve the dataset.

Dividing the Technical Specifications assists users in understanding the metadata specifications. The division is according to whether the specifications are 1) necessary for the correct operation of the portal software, 2) required information content to ensure minimal information for the evaluation, retrieval, and use of the dataset, or 3) recommended content that allows users to understand the data.

II. Scope

All metadata documents submitted for publication on the Montana Geographic Information Systems Portal

III. Technical Requirements

A. FGDC Compliance

Metadata documents submitted to the portal must be valid XML documents that conform to the structure set out in the Federal

Geographic Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM), version 2.

There is information about the CSDGM at http://www.fgdc.gov/metadata. The web site has links to free and commercial software tools available to assist publishers in creating FGDC-compliant XML metadata documents. The FGDC publishes a workbook describing the CSDGM, and a copy of this is available from the GIS Portal at http://gisportal.mt.gov/metadata/workbook.pdf.

The CSDGM contains information about what metadata elements are required and optional. For the purposes of the GIS Portal, the FGDC standard is a list of elements that are available to fill out. Some metadata software tools have various levels of enforcement of the element requirements from the CSDGM. GIS Portal publishers may exercise discretion on whether to obey the rules set up by the tool of their choice.

B. GIS Portal Functional Requirements

The portal displays the following metadata elements when users find metadata records or when users use them to classify and provide links to the data. The portal will not accept documents without proper entries in these mandatory fields. In this and subsequent lists, the metadata element name is followed by the XML path to the element in the metadata file and a description of the required content.

<Element Name>	Description
Title	(Path: idinfo/citation/citeinfo/title). Metadata must contain a title for the dataset. The title should describe the region covered by the dataset (such as "Montana", "Bozeman", or "Smith Watershed") and the subject (such as "Highways" or "Water Wells"). If the dataset or the particular copy of the dataset referenced by the metadata does not maintain up-to-date information, the title should include a date, for example "2006 Color Orthophoto of Helena, Montana" or "Yellowstone County School Districts, 1980".

<Element Name>	Description
Abstract	(Path: idinfo/descript/abstract) is a concise summary of important information about the dataset. In about three paragraphs or less, say everything you would want someone to know about the data, assuming this is all they were going to read.
Time Period of Content	(Path: idinfo/timeperd/timeinfo) is a date, dates, or range of dates when the dataset was valid. Enter dates in the metadata in YYYYMMDD format, such as 20080131. If you do not know the exact date, you may just fill out a year or year and month, as in 1995 or 199708. The FGDC standard allows you to fill this section with a publication date, but this is strongly discouraged, unless you have no reliable data-collection date.
Contact Organization	(Path: idinfo/ptcontac/cntinfo/cntorgp/cntorg) identifies the Publisher seen by users in the metadata search results. This element may appear under cntperp (Contact Person Primary) rather than cntorgp (Contact Organization Primary). The portal's advanced search page allows users to search for values from this field.
Point of Contact	(Path: idinfo/ptcontac) should be a person or office that can answer questions about the dataset. The address, city, state, and ZIP code must be complete.
Theme Keywords	(Path: idinfo/keywords/theme). There must be a theme keyword section that contains a themekt element (Theme Keyword Thesaurus) whose value is "ISO 19115 Topic Category" and one or more themekey elements (Theme Keywords) whose values comes from the list in Appendix A. The portal's advanced search page allows users to restrict their searches to records containing one of these keywords.
Place Keywords	(Path: idinfo/keywords/place/placekey). The portal will show these in the Coverage Area section of the metadata results.

<Element Name>	Description
Online Linkage	(Path: idinfo/citation/citinfo/onlink) is a link to a downloadable data file, a web site about the data, or a specification that allows the portal to add a web service to its map viewer. See Appendix B for the rules for this element.
Bounding Coordinates	(Path: idinfo/spdom/bounding) are the latitude and longitude coordinates of a rectangle that encloses the region covered by the dataset. The portal's advanced search page allows users to search for datasets, whose bounding coordinates intersect, or are within, any geographic region.
Resource Description	(Path: distinfo/resdesc) populated from a choice from a pre-set list of values. Its value result is in the Content Type section of the search and it helps control how the portal creates a link to the data. The portal's advanced search page allows users to search for values from this field. See Appendix B for the rules for this element.
Global Unique ID	(Path: esri/PublishedDocID). For the portal to recognize that a revised document you publish is the same as a document you previously published, you must insert a Global Unique ID into the document. Instructions for this are in Appendix C.

C. Required Information

The portal managers will review your metadata and, if it is available, the data it describes. If they feel they do not understand it or if the following sections are not properly completed, they may ask you to provide more information before they publish your metadata.

<Element Name>	Description
Originator	(Path: idinfo/citation/citeinfo/origin) is the agency or person primarily responsible for creating the dataset. If, for example, you obtained this data from the Census Bureau and you made several corrections to the data, you would still probably list the Census Bureau as the originator. You may enter multiple originators if you feel this is necessary.

<Element Name>	**Description**
Publication Date	(Path: idinfo/citation/citeinfo/pubdate) may be the first time this dataset is available to the public or the date of release for this specific version. Enter dates in the metadata in YYYYMMDD format, such as 20080131. If you do not know the exact date, you may just fill out the year or year and month, as in 1995 or 199708.
Publisher	(Path: idinfo/citation/citeinfo/pubinfo/publish) is probably your organization. Enter the name of the organization that is making this version of the data available to the public. If this version of the data is essentially unchanged from something you obtained from somewhere else (aside from easily accomplished format or projection changes), enter the name of the organization that is primarily responsible for making it public. If the organization does not make it public but provides it to you with permission to distribute, you may want to claim status as the publisher.
Spatial Reference Information	(Path: spref) is the definition of the coordinate system and datum of the data. The format of this section is highly variable depending on the type of coordinate system you are using. If your metadata tool does not fill this section out automatically, refer to the instructions in the CSDGM workbook.
Entity and Attribute Information	(Path: eainfo) is where you list the tables and data fields that come with your data and provide explanations of what they contain. Fields that have a limited domain should have a list of the allowable values and, if applicable, their meanings. See Appendix D for some examples.
Distributor	(Path: distinfo/distrib/cntinfo) contains information on who to contact about getting a copy of the data.
Metadata Date	(Path: metainfo/metd) is the latest revision date of the metadata. Enter dates in the metadata in YYYYMMDD format, such as 20080131. If you do not know the exact date, you may just fill out the year or year and month, as in 1995 or 199708.
Metadata Contact	(Path: metainfo/metc) is the person who wrote the metadata.

D. Other Important Metadata Fields

You are strongly encouraged to fill out these fields. These fields help clarify your records. In some cases, the portal managers may ask you to fill some of these out if they feel an element from this list is especially important for your dataset.

<Element Name>	Description
Purpose	(Path: idinfo/descript/purpose) describes a specific purpose for which the data is developed or something for which you want other people to use it. However, examples are not required.
Access Constraints	(Path: idinfo/accconst). If there are restrictions on who may obtain the data, or agreements regarding who may access the data, put them here.
Use Constraints	(Path: idinfo/useconst). Enter any cautions or restrictions on the use of the data here.
Progress	(Path: idinfo/status/progress) indicates whether the dataset is a finished product. If there are constant updates to the data, you can still indicate it is "complete," meaning you have all the latest data you know about.
Update Frequency	(Path: idinfo/status/update). Enter the data update frequency.
Browse Graphic	(Path: idinfo/browse). If you have an online picture or map that features the data, put a link to it in this section. This will show users a thumbnail image of the picture and/or a link to it.
Completeness Report	(dataqual/complete). If there is some subset of the data that is missing, enter that information here. For example, "No data is available for Dawson County" or "Streams less than two miles long have been omitted."

<Element Name>	Description
Attribute Accuracy Report	(dataqual/attracc/attraccr). If there is something you should say about the accuracy of any of the data's attribute fields, put it here. For example, "Each well ID number was independently checked against the source map by two technicians" or "Standard deviation for Calcium concentration in control samples was 8 mg/L."
Horizontal Positional Accuracy Report	(dataqual/posacc/horizpa/horizpar). Enter what you know about the accuracy of the coordinates. For example, "GPS coordinates were not differentially corrected, and the receiver reported accuracy values of between 10 meters and 40 meters during the survey."
Vertical Accuracy Report	(dataqual/vertacc/vertaccr). Describe the accuracy of any elevation information in the dataset. For example, "elevations were estimated from a topographic map whose contour interval is 80 feet."
Source Information	(dataqual/lineage/srcinfo). Enter the names of the documents or datasets from which you obtained information for this dataset. See Appendix E for examples.
Process Steps	(dataqual/lineage/procstep). Enter here information about what you did to create the data. See Appendix E for examples.

IV. Administrative Use

    A. Scheduled Review Date: October 1, 2014

    B. Changes: June 30, 2011 – Non-material changes made:
- Corrected URLs.
- Changed to MoM Format

Appendix A - Theme Keywords

Metadata documents for the Montana GIS Portal must have a Theme Keyword section that contains a Theme Keyword Thesaurus whose value is "ISO 19115 Topic Category" and at least one Theme Keyword whose value is from the following list. A sample XML theme keyword section containing all the values follows:

farming	intelligenceMilitary
biota	inlandWaters
boundaries	location
climatologyMeteorologyAtmosphere	oceans
economy	planningCadastre
elevation	society
environment	structure
geoscientificInformation	transportation
health	utilitiesCommunication
imageryBaseMapsEarthCover	

```
<theme>
  <themekt>ISO 19115 Topic Category</themekt>
  <themekey>farming</themekey>
  <themekey>biota</themekey>
  <themekey>boundaries</themekey>
  <themekey>climatologyMeteorologyAtmosphere</themekey>
  <themekey>economy</themekey>
  <themekey>elevation</themekey>
  <themekey>environment</themekey>
  <themekey>geoscientificInformation</themekey>
  <themekey>health</themekey>
  <themekey>imageryBaseMapsEarthCover</themekey>
  <themekey>intelligenceMilitary</themekey>
  <themekey>inlandWaters</themekey>
  <themekey>location</themekey>
  <themekey>oceans</themekey>
  <themekey>planningCadastre</themekey>
  <themekey>society</themekey>
  <themekey>structure</themekey>
  <themekey>transportation</themekey>
  <themekey>utilitiesCommunication</themekey>
</theme>
```

Appendix B - Resource Description and Online Linkage

The portal uses the Resource Description and Online Linkage sections of your metadata to determine how to describe whether your data is a GIS layer or not and to determine if it can be downloaded or added to a map viewer.

The **Resource Description** may have the following values. Generally, the Montana GIS Portal will concentrate on the first three types.

Live Data and Maps (Web services that may be added to map applications)
Downloadable Data (GIS data files available for download)
Offline Data (Data files that you have to order)
Static Map Images (Map images available for download)
Document
Applications
Geographic Services
Clearinghouse
Map Files
Geographic Activities

The **Online Linkage** is a link to a web service, a file containing GIS data or a map, or a web site that has more information about the data or how to obtain it. Depending on the value of the Resource Description and the format of the Online Linkage, the portal will create links in the search results, thereby allowing for downloads or for adding the results to the map viewer. The rules for this follow. If a combination is found that does not follow these rules, the portal will classify the record as an "Other Document" and make a link with the Online Linkage labeled "Go to Website."

If the Resource Description is Live Data and Maps:
The portal will assume the data is accessible through an ArcIMS service and make a button for adding the service to the map viewer if the Online Linkage has the following form.

http://<server>/image/<service>
The portal will assume the data is accessible through an Open Geospatial Consortium (OGC) Web Mapping Service and make a button for adding the service to the map viewer if the Online Linkage has any of the following forms.
http://<server>/<servlet-path>/com.esri.wms.Esrimap
http://<server>/<OGC Type>/<path>
(OGC Type is wfs, wms, or wcs)
http://<server>/<path>/service=<OGC Type>
http://<server><path><text>request=getmap<text>

If the Resource Type is Downloadable Data, the portal will assume the data is available in a downloadable file and make a button labeled "Download Data" for the link

if the Online Linkage has a file extension of zip, gz, tar, tgz, dbf, shp, rar, xls, txt, dwg, dxf, dgn, or e00 and has one of the following forms:
http://<server>/<path>/<filename>.<extension>
ftp://<server>/<path>/<filename>.<extension>

If the Resource Type is Static Map Images, the portal will assume the record refers to a downloadable map file. Further, it will make a button labeled "View Map" for the link under the following conditions: if, and only if, the Online Linkage has a file extension of gif, jpg, jpeg, bmp, pdf, pmt tif, tiff, cal, pct, pict, eps, mxd, av, mpg, mpeg, wmv, img, or rm and has one of the following forms:
http://<server>/<path>/<filename>.<extension>
ftp://<server>/<path>/<filename>.<extension>

Appendix C - Global Unique IDs

For each metadata document, you must enter a Global Unique ID (GUID). This allows the portal to recognize the document after the first time it has encountered it. If you upload a document to the portal a second time, or if the portal harvests the folder the document is in more than once, it will assume it is looking at a new document and load a duplicate copy of it into the database if the document does not contain a GUID it has seen before.

Insert the GUID section into the metadata with a plain-text editor immediately before the last line of the file. The last line of the file should be "</metadata>." Below is an example of a GUID section and the last line of a metadata file.

```
 <Esri>
  <PublishedDocID>
   {13B2A163-4EE2-4204-B553-6309DD3434C2}
  </PublishedDocID>
 </Esri>
 </Metadata>
```

The GUID is the number between the curly braces. You must provide a different GUID for each file. Make sure you do NOT copy any GUID you see in any document. You can use many of the free GUID generators on the Web to create unique GUIDs for your metadata files.

Appendix D - Entity and Attribute Samples

These examples show the XML-formatted metadata. We intend that you will be able to relate these examples to the fields your metadata editor tool presents. Most metadata tools will create Entity and Attribute sections that are more complicated. The metadata tools will create more information that you need, but you may leave the extra information there. The following examples show a minimum set of information that is still very useful.

Example 1

This dataset is a shapefile that shows the county boundaries. Shapefiles have intrinsic feature ID (FID) and Shape fields, and this one has a FIPS code field and a county name field. You could list all possible values for the FIPS code and county name, but it is not necessary.

```
<eainfo>
  <detailed>
   <enttyp>
    <enttypl>county.dbf</enttypl>
   </enttyp>
   <attr>
    <attrlabl>FID</attrlabl>
    <attrdef>Internal feature number</attrdef>
   </attr>
   <attr>
    <attrlabl>Shape</attrlabl>
    <attrdef>Feature Geometry</attrdef>
   </attr>
   <attr>
    <attrlabl>FIPS</attrlabl>
    <attrdef>
      Federal Information Processing Standard code for the county
    </attrdef>
   </attr>
   <attr>
    <attrlabl>County</attrlabl>
    <attrdef>County Name</attrdef>
   </attr>
  </detailed>
</eainfo>
```

Example 2

This dataset is a personal geodatabase feature class named "signs." The business table for a feature class has the same name as the feature class. This one contains an ObjectID field, a Shape field, a field with a code that describes the sign's condition

(whose values are not explained anywhere in the database), and a field with a code that describes the signpost type. The geodatabase has another table that lists the allowable signpost type codes and their meanings. In this case, it is very important for the metadata to explain the condition codes. Also, the metadata author thought it would be useful to have a list of the signpost type codes and their meanings.

```
<eainfo>
 <detailed>
  <enttyp>
   <enttypl>signs</enttypl>
  </enttyp>
  <attr>
   <attrlabl>ObjectID</attrlabl>
   <attrdef>Internal feature number</attrdef>
  </attr>
  <attr>
   <attrlabl>Shape</attrlabl>
   <attrdef>Feature Geometry</attrdef>
  </attr>
  <attr>
   <attrlabl>Condition</attrlabl>
   <attrdef>Code for sign condition</attrdef>
   <attrdomv>
    <edom>
     <edomv>1</edomv>
     <edomvd>Good</edomvd>
    </edom>
    <edom>
     <edomv>2</edomv>
     <edomvd>Fair</edomvd>
    </edom>
    <edom>
     <edomv>3</edomv>
     <edomvd>Poor</edomvd>
    </edom>
   </attrdomv>
  </attr>
  <attr>
   <attrlabl>Type</attrlabl>
   <attrdef>
     Signpost Type Code. Code values are explained in the TypeCode table.
   </attrdef>
  </attr>
 </detailed>
 <detailed>
  <enttyp>
   <enttypl>TypeCode</enttypl>
```

```
    <enttypd>List of Signpost Type Codes and their meanings</enttypd>
  </enttyp>
  <attr>
   <attrlabl>Type</attrlabl>
   <attrdef>
    Signpost Type Code. Code values are explained in the Definition field.
   </attrdef>
   <attrdomv>
    <edom>
     <edomv>1</edomv>
     <edomvd>Steel</edomvd>
    </edom>
    <edom>
     <edomv>2</edomv>
     <edomvd>Aluminum</edomvd>
    </edom>
    <edom>
     <edomv>3</edomv>
     <edomvd>Wood</edomvd>
    </edom>
   </attrdomv>
  </attr>
  <attr>
   <attrlabl>Definition</attrlabl>
   <attrdef>Explanation of the Signpost Type Code.</attrdef>
  </attr>
 </detailed>
</eainfo>
```

Appendix E - Source Information and Process Step Samples

This example shows the XML-formatted metadata. We anticipate that you will be able to relate this example to the fields your metadata editor tool presents. Most metadata tools will create metadata that is more complicated than this. This example shows a minimum set of information that is still very useful.

This example describes the sources and processing steps for a well database. Some of the well locations came from the Montana Ground Water Information Center, while others came from digital GPS. The attributes for the GPS wells came from an imaginary private database.

```
<lineage>
 <srcinfo>
  <srccite>
   <citeinfo>
    <origin>
      Montana Bureau of Mines and Geology
      Ground-Water Information Center
    </origin>
    <pubdate>2000</pubdate>
    <title>Well Log Data</title>
    <pubinfo>
     <pubplace>Butte, Montana</pubplace>
     <publish>Montana Bureau of Mines and Geology</publish>
    </pubinfo>
    <onlink>http://mbmggwic.mtech.edu</onlink>
   </citeinfo>
  </srccite>
  <srctime>
   <timeinfo>
    <sngdate>
     <caldate>2000</caldate>
    </sngdate>
   </timeinfo>
  </srctime>
  <srccontr>
    The locations and attributes of wells whose Source field has a value of "1"
were obtained from this source.
  </srccontr>
 </srcinfo>
 <srcinfo>
  <srccite>
   <citeinfo>
    <origin>Smith Surveyors</origin>
    <pubdate>Unpublished Material</pubdate>
    <title>GPS Well Cooordinates</title>
```

```xml
        <othercit>
          1817 14th Avenue North
          Kalispell, MT 59901
          406-755-9999
        </othercit>
      </citeinfo>
    </srccite>
    <srctime>
      <timeinfo>
        <sngdate>
          <caldate>20010822</caldate>
        </sngdate>
      </timeinfo>
    </srctime>
    <srccontr>
      The locations of the wells whose Source field has a value of "2" were obtained
via GPS survey by this source.
    </srccontr>
  </srcinfo>
  <srcinfo>
    <srccite>
      <citeinfo>
        <origin>Jones Consulting</origin>
        <pubdate>Unpublished Material</pubdate>
        <title>Well log data</title>
        <othercit>
          817 12th Street West
          Whitefish, MT 59937
          406-863-9999
        </othercit>
      </citeinfo>
    </srccite>
    <srctime>
      <timeinfo>
        <sngdate>
          <caldate>20010714</caldate>
        </sngdate>
      </timeinfo>
    </srctime>
    <srccontr>
      The attributes of the wells whose Source field has a value of "2" were
obtained from this source.
    </srccontr>
  </srcinfo>
  <procstep>
    <procdesc>
```

Download the well log spreadsheet from GWIC, load data as a table in ArcMap, set up an event theme using the latitude and longitude fields, and export data to a personal geodatabase feature class.
   </procdesc>
   <procdate>**20010904**</procdate>
  </procstep>
  <procstep>
   <procdesc>

Load GPS well location table, and set up event theme. Load well attribute data as an Access table. Join attribute data to GPS locations using the Well ID field. Export joined tables as a feature class.
   </procdesc>
   <procdate>**20010904**</procdate>
  </procstep>
  <procstep>
   <procdesc>**Combine the GPS well data with the GWIC well data.**</procdesc>
   <procdate>**20010905**</procdate>
  </procstep>
 </lineage>